

## Tutorial 1

### *Discussion questions*

1. Read the Australian Association of Mathematics Teachers Standards for Excellence. Describe the best maths teacher you had in school. At which aspects of the Standards for Excellence did they excel?
2. Read the ACARA Shape of the National Curriculum in Mathematics. Does this align with the NCTM Standards-based curriculum discussed in chapter 1 of the text? What do you see as the strengths or weaknesses of the ACARA document?

### *Problems*

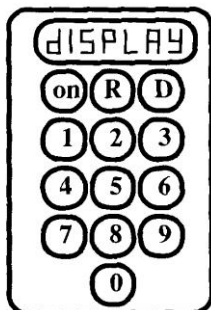
#### **1. Coffee, cat and cake\***

Ten minutes before I put a cake in the oven, I put my cat outside. The cake had to cook for 35 minutes, so I set the oven timer for 35 minutes. I immediately made myself a cup of coffee, which took me six minutes.

Three minutes before I finished drinking my coffee, the cat came back inside. This was five minutes before the oven timer went off. The telephone rang half way between the time I finished making my coffee and when the cat came inside. After a 5-minute conversation, I hung up. It was then 3.59pm.

- a) At what time was the cat put outside?
- b) How long had the cat been outside when the telephone rang?

#### **2. Veronica's calculator\***



Veronica's calculator has only two function buttons, D and R. On pushing the D button, the displayed number is doubled. Pushing the R button removes the right hand digit of the number (except for single digit numbers which are unchanged).

For example, if 1234 is displayed and the R button is pressed, the number changes to 123. If D is then pressed this number then changes to 246.

- a) What is the result of starting with 2002, and pushing the buttons D, D, D and R in that order?
- b) Veronica entered the number 45 and produced 1 in the display by pushing the function buttons a number of times, in a certain order. Show one way she could have done this.
- c) Starting from 1 each time, show how to obtain the numbers 19 and 23.

- d) Explain how you can always change any number back to 1.

### 3. Wildlife Park\*

The local wildlife park has an area where there are three types of native animals: bandicoots, bettongs and quolls. Visitors can see these animals on torchlight tours. The park rangers keep records of the number of each type of animal. At the end of 1999 and 2000, there were three times as many bettongs as quolls and half the total animal population was bandicoots.

- If there were 3 quolls at the end of 1999, what was the total animal population?
- If the total population at the end of 2000 was 40, how many bandicoots, bettongs and quolls were there?

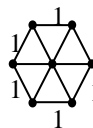
At the end of 2001, the total animal population had grown to 55. there were still three times as many bettongs as quolls, and more than half the total animal population was bandicoots.

- The Chief Ranger thought he counted 8 quolls. Was he right?
- What is the largest number of quolls there could have been in the area at the end of 2001?

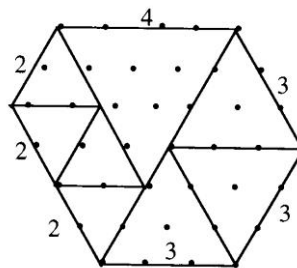
### 4. Hexals\*

A hexal is a hexagon with all six angles equal to  $120^\circ$ . John and Alice have a supply of equilateral triangles, all with integer side lengths. There is a large number of every size. John and Alice used some of these triangles to make hexals.

John made this hexal using six triangles, each of side 1. It has a perimeter of 6.

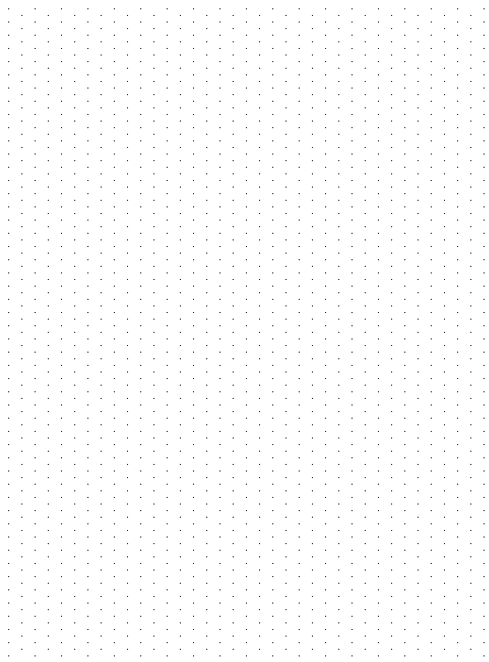


Alice made this hexal with perimeter 19 using eight triangles.



Draw diagrams on isometric dot paper to show how to make:

- A hexal with perimeter 8 from seven triangles
- A hexal with perimeter 10 from eight triangles.
- Alice took six triangles from the pile and made a hexal using all six of them. John then took seven triangles from the pile and made a hexal using all of them. Alice took eight triangles and made a hexal. They continued making hexals, each time using one more triangle than the time before. Explain how they could keep going forever.



*\* These questions are used with permission from the Mathematics Challenge for Young Australians (Primary) produced by the Australian Mathematics Trust. See <http://www.amt.edu.au> for further details.*